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EXPERIENCES IN REBUILDING AND REËNFORCING A WATER WORKS SYSTEM¹

BY O. T. SMITH

It may be well to state, in the beginning, some of the conditions under which the work was done so that a better understanding may be had of the situation. The franchise of the Water Company expired July 1, 1912, and negotiations were begun for a sale or a renewal of the franchise a year and a half previous to that date. The Chamber of Commerce of the city was brought into the negotiations by the city council agreeing to the appointment of a committee of ten of the members of the association to assist the city council in the purchasing of the plant or in passing a franchise. Arrangements were made to proceed under the clause in the franchise which gave the city the right to purchase at its expiration. The preliminary negotiations showed that the city had no power to purchase, but it was agreed that there should be a valuation of the plant, proceeding as though the city could purchase. It was further agreed that the commission required by the franchise should be requested to suggest a proper ordinance which of course included the suggestion of fair rates.

The appraisal was made and the commission's valuation was accepted by both the city and the company. The proceedings of the commission were considered entirely fair by both parties. The city selected an eminent engineer, Mr. F. E. Tuneaure, Dean of Engineering of the University of Wisconsin. The water company chose Mr. John W. Alvord, of Chicago, and the two agreed upon Dean Marston, of the University of Iowa, as the third member of the commission. The commission was required also to outline the necessary improvements and make an estimate of the cost of the said improvements, to place the plant in proper condition to give adequate fire protection and private service for a period of years, the whole to be made a basis for fixing rates and charges.

¹ Read at first meeting Illinois Section, American Water Works Association, March 10, 1915.

Previous to the beginning of the negotiations the company had prepared an inventory of its property under the direction of Mr. Dabney H. Maury. This inventory was accepted by the commission together with a supplementary inventory covering the two years subsequent to Mr. Maury's inventory, made by the city engineer and the writer together. The commission estimated the cost of additional improvements and extensions at \$182,000 by the end of 1916. The ordinance as finally passed included these improvements and extensions as a condition of the extension of the franchise for thirty years.

The improvements outlined by the commission were additional high service and low service pumps, additional filter plant, additional boiler capacity, additional storage reservoir, and additional water supply, together with about thirteen miles of mains for the reinforcement and extension of the distribution system. This work was begun in the fall of 1912. Pumps were contracted for, cast iron pipe was purchased, and the work progressed to final completion in the fall of 1914. The work of connecting the new pumps with the old system and the many necessary connections at street intersections were interesting, and, frequently, rather complicated propositions. In most cases the street intersection connections were made by using a cross with a valve on each side of the old main, using a Smith style tapping machine for the work.

In the improvements required were two new river crossings, owing to the fact that the great factory district was on the easterly side of the river. One crossing was a 10-inch and the other an 8-inch. These were in addition to one 8-inch crossing which was in the original plant. To facilitate the work of laying mains the company concluded to purchase a trench machine and decided upon a second-hand machine which paid for itself in the two years operation, several times over. As an indication of the value of this machine; at one time the machine was out of commission for four days and in order to complete an extension before cold weather the gang of men were kept and did the digging by hand. During four days until the machine was again in commission with hand labor with the same number of men, exactly the same amount of pipe was laid that was laid in one day after the machine was again in use. Of course, all situations did not show such results, but there were enough of such jobs to make the purchase of the machine very economical. In making the river crossings a universal joint was

used. Of course, this is not new to you but is of interest, as to the manner in which a small river crossing can be made successfully.

In addition to the work which was specifically mentioned and required in the ordinance, the city under its right to order further extensions, exercised that right frequently during the period of construction, and during the two years and a half which have elapsed the city has ordered and the company has laid about four miles of extra extensions. The basis on which the city may order an extension is considered a fair one. The requirements of the ordinance covering the reinforcement of the system, practically entirely for fire protection, were that the city should pay a certain fixed sum for fire protection covering the improvements, additions, and extensions specifically named in the ordinance, and for additional extensions by the payment of an annual rental of as many cents per lineal foot as equals one-half of the diameter of the pipe in inches plus a specific price for each hydrant placed on such extensions. For instance, if the city orders an extension of 500 feet of 6-inch main and a hydrant, they would pay \$15 per annum for the mains and \$7.50 per annum for the hydrant. This arrangement has resulted in the city freely ordering extensions where called for by prospective private consumers; and the cheapness of the hydrant rental has resulted in a much more frequent spacing of hydrants which is required by the ordinance and is very desirable.

The financial result under this ordinance has been satisfactory. The changing from flat rates to meters has increased the revenue substantially, while the pumpage has decreased, not to a very remarkable extent, but during the year 1914 the pumpage was less than in any year during the three years previous.

The rates on meter bills are figured by the hundred feet and the maximum rate is for the first 2000 feet per month. The next 3000 feet is at a lower rate and all over 5000 feet is at another rate so that every consumer gets the same rate for the same amount consumed, and the more he uses, the less the rate, automatically.